

Two New Species of *Leptochelia* (Crustacea, Tanaidacea) from the West Coast of Korea

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ABSTRACT

Two new species of *Leptochelia* Dana, 1849 are described from the western coast of Korea. *Leptochelia grandidentata* n. sp. is similar to *L. itoi* and *L. lusei* characterized by pleonites 4 and 5 of subequal lengths and a uropod endopod with 4 articles but differentiated by a cheliped fixed finger longer than the dactylus and with 4 teeth along the incisive margin, a maxilliped basis with 4 distal setae, and pereopod 1 propodus that is much longer than the combined length of unguis and dactylus. *Leptochelia suhi* n. sp. shares some features of *L. myora* with the first article of the uropod endopod longer than the second article and a maxilliped endite with 3 spiniform distal setae but can be differentiated by the cephalothorax being longer than the pleon, the relatively longer antennule article 3 compared to article 2, and the cheliped fixed finger with 3 robust teeth along the incisive margin. In this study, full descriptions of *L. grandidentata* and *L. suhi* are given, and a comparison with closely related species belonging to the '*dubia/savignyi* group' is tabulated and discussed.

Keywords: Korean coastal waters, macrobenthos, Tanaidaceans, *Leptochelia*, *dubia/savignyi* group

INTRODUCTION

Tanaidaceans are small peracarid crustaceans that occur in all marine habitats, over a full range of depths, and rarely in fresh waters. Tanaidaceans had an unclear status until the 19th century, commonly being classified with the Isopoda or occasionally within the Amphipoda (Blazewicz-Paszkowycz and Bamber, 2012). These species were given a separate ordinal status by Hansen (1895). Currently the order includes almost 1200 described species. Within the tanaidaceans, the genus *Leptochelia* Dana, 1849 has been one of the most-studied taxa worldwide (Brown, 1957; Larsen and Rayment, 2002). To date, 43 species of *Leptochelia* have been described (Anderson, 2013), however, in the Pacific Northwest only two species, *L. itoi*, 1985 and *L. savignyi* Ishimaru, 1985 from the Japanese coast have been described, and no species has been described in Korean coastal waters.

Leptochelia is mainly identified by its male antennules, uropod (numbers of segments) and shape of the cheliped, by

which it is divided into two groups: *minuta*-group and *dubia/savignyi*-group. The females are largely ignored due to poor definition and highly polymorphic diagnostic characters (Lang, 1973; Bamber and Bird, 1997; Larsen and Rayment, 2002; Bamber, 2010). As a result, the *dubia/savignyi*-group has had many synonyms, and many new species have been assigned as *L. dubia* or *L. savignyi*. To resolve this taxonomic problem, in the two most decades, many new and often sympatric species included in the *dubia/savignyi*-group have been described or redescribed (Ishimaru, 1985; Bamber, 2005, 2006, 2008), based on comparison of their detailed morphology, particularly of females (Bamber, 2010). Moreover, the fact that tanaidaceans have a minimal inherent dispersive ability, indicates that the populations are inevitably isolated and will undergo allopatric speciation, leading to high regional diversity (Blazewicz-Paszkowycz and Bamber, 2012). It is therefore apparent that a precise identification and comparison among the *Leptochelia* species are needed for individuals from different regions, including morpholog-

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ical details such as the mouthparts, pereopods, and pleopods.

This study provides full descriptions of females of two new species of *Leptochelia* from the west coast of Korea and confirms their morphological distinction through comprehensive comparisons with closely related species previously recorded.

MATERIALS AND METHODS

The materials were obtained from sublittoral sandy bottom of the Taean coast located west of Korea ($36^{\circ}41'39''\text{N}$, $126^{\circ}41'87''\text{E}$, 5 m depth) (Fig. 1) by standard 0.05 m^2 van Veen grab. The specimens were extracted by washing the substrates through a $250\text{ }\mu\text{m}$ sieve, and the residue from each sieve was preserved in 5% formalin seawater solution. Later the collected animals were identified and counted in the laboratory. Specimens were dissected under a dissection microscope (Nikon JP/E200; Nikon, Tokyo, Japan) in CMC-10 aqueous mounting medium (Masters, Wood Dale, IL, USA), mounted on slides, and sealed with high-quality nail varnish. Drawings were generated using a differential interference contrast microscope (Nikon AFX-II) that was equipped with a drawing tube. The total length was measured from the tip of the rostrum to the pleotelson apex in dorsal view. Scale bars are given in mm. The morphological terminology follows Larsen (2003) and Bamber (2008). The type and other materials examined are deposited in the collections of the Marine Biodiversity Institute of Korea (MABIK), Seocheon,

South Korea.

SYSTEMATIC ACCOUNTS

Suborder Tanaidomorpha Sieg, 1980

Family Leptochelidae Lang, 1973

Genus *Leptochelia* Dana, 1849

Leptochelia grandidentata n. sp. (Figs. 2–4)

Material examined. Holotype: adult female collected from Taean in the west sea of Korea ($36^{\circ}41'39''\text{N}$, $126^{\circ}41'87''\text{E}$, 5 m depth; collector: Man-Ki Jeong) on 30 Mar 2015, dissected and mounted on 2 slide glasses (MABIKCR00235205). Paratype: 1 adult female, 1 juvenile in 1 vial (MABIKCR00235206), same data as holotype.

Description. Female: Non-ovigerous. Body (Fig. 2A, B) length 3.2 mm, 7.6 times as long as wide. Cephalothorax sub-rectangular, proximal margin with conspicuous rounded rostrum, eye lobes rounded, eyes present, 1.4 times as long as wide, slightly longer than pereonites 1 and 2, proximo- and mid-lateral margins each with 1 simple setae.

Pereon (Fig. 2A, B). Pereonite 1 shortest, 0.4 times as long as cephalothorax, with 2 simple setae on proximolateral margin. Pereonites 2 to 4 gradually longer, each with 1 simple seta on mid-lateral margin. Pereonites 4 and 5 of equal length longest. Pereonite 6 subequal to pereonite 3. Pereonites 1–6 proportional lengths 12.0 : 14.9 : 17.1 : 19.6 : 19.6 : 16.6.

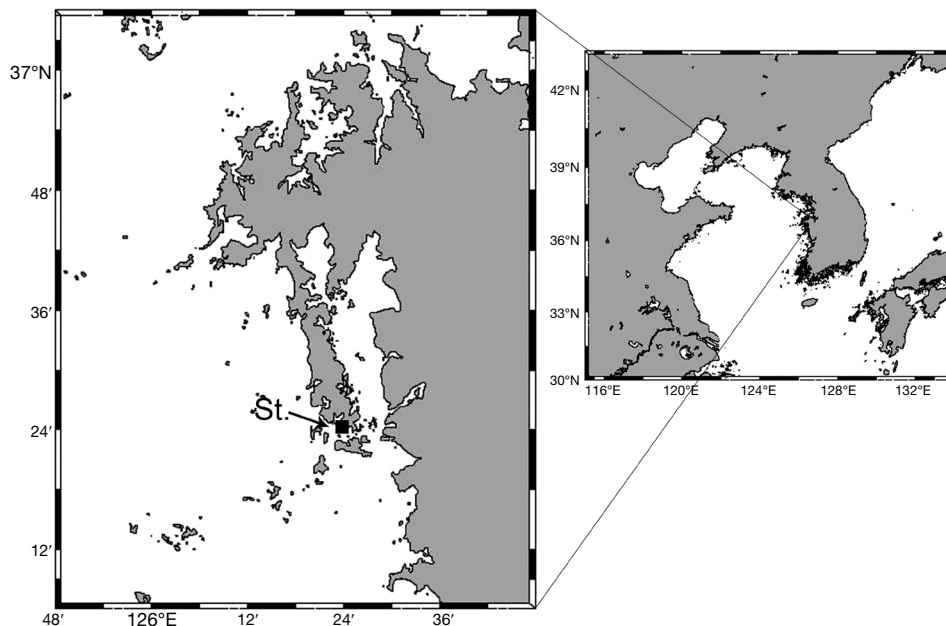


Fig. 1. Map showing sampling station.

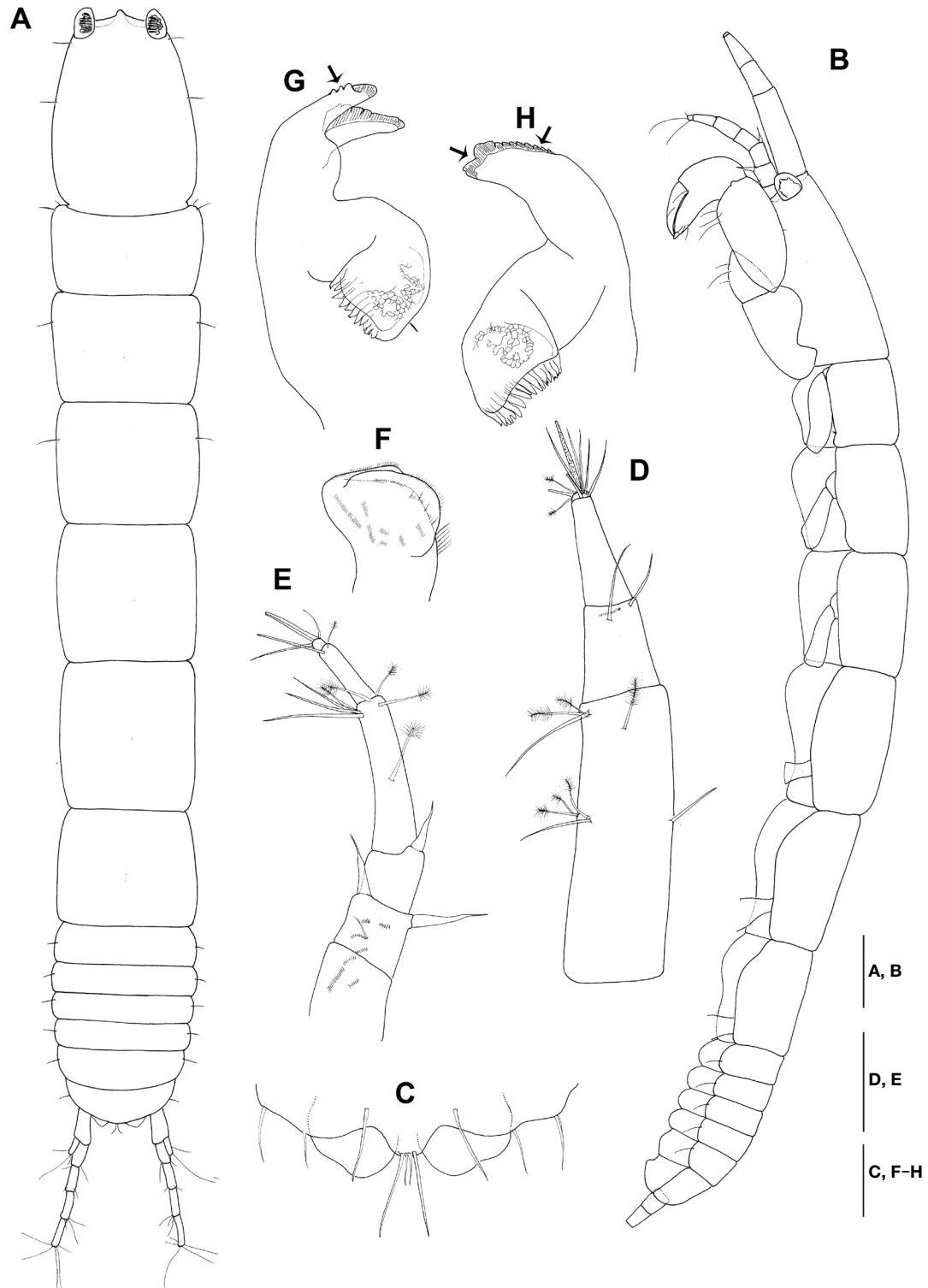


Fig. 2. *Leptochelia grandidentata* n. sp. female (holotype). A, Habitus, dorsal view; B, Habitus, lateral view; C, Pleotelson, distal part; D, Antennule; E, Antenna; F, Labrum; G, Left mandible; H, Right mandible. Scale bars=0.2 mm (A, B), 0.05 mm (C, F-H), 0.1 mm (D, E).

Pleon (Fig. 2A, B) with 5 free pleonites, each pleonite with pair of pleopods and simple seta on lateral margin. Pleonite 1 longest, 0.3 times as long as wide. Pleonites 2 to 4 subequal in length. Pleonites 1–5 1.1 times as long as wide, 1.3 times as long as pereonite 5.

Pleotelson (Fig. 2A–C) semicircular, 0.3 times as long as pleonites 1–5, 0.4 times as long as wide, bearing simple seta each on lateral and distal margins. Pleonites and pleotelson proportional lengths 25.7 : 18.9 : 17.8 : 17.8 : 17.8 : 19.8.

Antennule (Fig. 2D) with 4 articles. Proportional lengths 57.9 : 18.2 : 22.3 : 1.6. Article 1 elongate, 2.9 times as long as wide, with 3 broom setae and 1 simple seta on outer medial margin, 2 broom setae and 1 long simple seta on outer distal margin, 1 broom seta on mid-dorsal margin, and 1 simple seta on inner margin. Article 2 distally tapered, distal margin with 2 simple setae and ornamented with fine setules. Article 3 1.2 times as long as article 2, with 1 broom seta and 2 simple setae on distal margin. Article 4 minute, with 1 broom seta, 5 slender simple setae, and 1 aesthetasc.

Antenna (Fig. 2E) shorter and slender than antennule, with 6 articles of proportional lengths 17.5 : 14.8 : 14.0 : 35.1 : 15.8 : 2.8. Article 1 ornamented with minute setules. Article 2 as long as wide, with 1 simple seta and rows of setules on mid outer margin, 1 inner distal and 1 outer distal simple spines. Article 3 with 1 outer distal simple spine. Article 4 longest, 2.4 times longer than article 3, 3.3 times as long as wide, with 1 broom seta on mid-ventral margin, 3 broom setae and 4 simple setae on distal margin. Article 5 3.3 times as long as wide, with 1 broom seta and 1 simple seta on distal margin. Article 6 short, with 3 simple setae on distal margin.

Mouthparts. Labrum (Fig. 2F) rounded, ornamented with fine setules, typical of genus. Left mandible (Fig. 2G) incisor distally tapered, with 3 irregular processes (indicated by arrow). Lacinia mobilis wider than incisor, distally pointed and with 6 blunt processes along outer margin. Molar process robust and rugose, dorsal surface crumpled, with 11 irregular teeth. Right mandible (Fig. 2H) without lacinia mobilis, incisor apex weakly bifurcate (indicated by arrow), outer margin crenulated (indicated by arrow). Molar process with 15 distal teeth. Labium (Fig. 3A) with 2 pairs of lobes, outer one larger than inner one, distal margin densely setose. Maxillule (Fig. 3B) endite with 8 distal spiniform setae, ornamented with fine setules on distal margin. Palp slender, with 2 long distal setae. Maxilla not figured. Maxilliped (Fig. 3C) bases not fused, each with 4 simple setae, longer than endite. Endite (Fig. 3D) fused to basis; prominent dorsal surface with 2 spatulate setae and 1 forked seta (indicated by arrows) on distal margin; extended ventral surface with 2 short setae and ornamented with fine setules on distal margin. Palp article 1 with simple seta on outer distal margin. Palp article 2 with 1 outer seta and 4 inner setae. Palp article 3

with filtering rows of 6 long setae and 2 short slender setae, respectively. Palp article 4 with 2 simple setae on outer margin, 1 slender seta on subdistal margin, 5 setae on inner margin, and distal margin ornamented with fine setules.

Cheliped (Fig. 3E, F) basis divided unequally by sclerite attached dorsally, 1.5 times as long as wide, with 1 dorsal simple seta. Merus subtriangular, with 3 simple setae on ventral margin. Carpus 1.2 times as long as basis, 1.9 times as long as wide, ventral margin with 3 simple setae subdistally, dorsal margin with proximal seta and distal seta. Propodus almost as long as basis, 1.8 times as long as wide, inner margin with 5 simple setae (indicated by arrow). Fixed finger with 2 setae on ventral margin and 3 setae near cutting edge, and 1 seta near insertion of dactylus and cutting edge with 4 strong blunt denticles. Dactylus shorter than fixed finger (arrowed in Fig. 3F), with 1 seta on inner proximal margin.

Pereopod 1 (Fig. 4A) longest of all pereopods. Coxa with 1 simple seta. Basis 2.8 times as long as wide, with 1 broom seta and 1 simple seta on dorsoproximal margin. Ischium compact, with 1 seta. Merus with 1 short slender seta on ventrodistal margin. Carpus 5 simple setae, longest of which extended to third of propodus. Propodus 1.4 times as long as carpus, with 3 simple setae of unequal length and patches of setules on dorsodistal margin and 1 spiniform seta on ventrodistal margin. Dactylus slender, with simple seta on dorsoproximal margin. Unguis 0.7 times longer than dactylus. Combined length of dactylus and unguis 1.4 times longer than propodus.

Pereopod 2 (Fig. 4B) much shorter than pereopod 1. Coxa as pereopod 1. Basis 2.5 times as long as wide, longer than carpus and propodus combined, with 1 broom seta on ventroproximal margin. Merus with spiniform seta and fine setules on distal margin. Carpus as long as merus, with 2 simple setae and 1 short spiniform seta on distal margin. Propodus 1.3 times as long as carpus, with 1 small spiniform seta, 3 simple setae, and 2 minute spines on distal and subdistal margins (indicated by arrows). Dactylus and unguis combined 0.8 times as long as propodus. Dactylus with 1 dorso-proximal seta, longer than unguis.

Pereopod 3 (Fig. 4C) longer than pereopod 2. Basis 2.4 times as long as wide, with 2 broom setae and 1 simple seta on ventroproximal margin. Merus similar to that of pereopod 2. Carpus slightly longer than merus, with 1 short spiniform seta and 2 simple setae on distal margin. Propodus 1.3 times as long as carpus, with 2 short spiniform setae, vertical row of setules, 3 slender simple setae, and 2 small spines on distal margin. Dactylus and unguis combined 0.7 times as long as propodus.

Pereopod 4 (Fig. 4D) coxa fused to body. Basis 1.7 times as long as wide. Ischium with 2 slender simple setae. Merus with 2 ventrodistal spiniform setae. Carpus as long as merus,

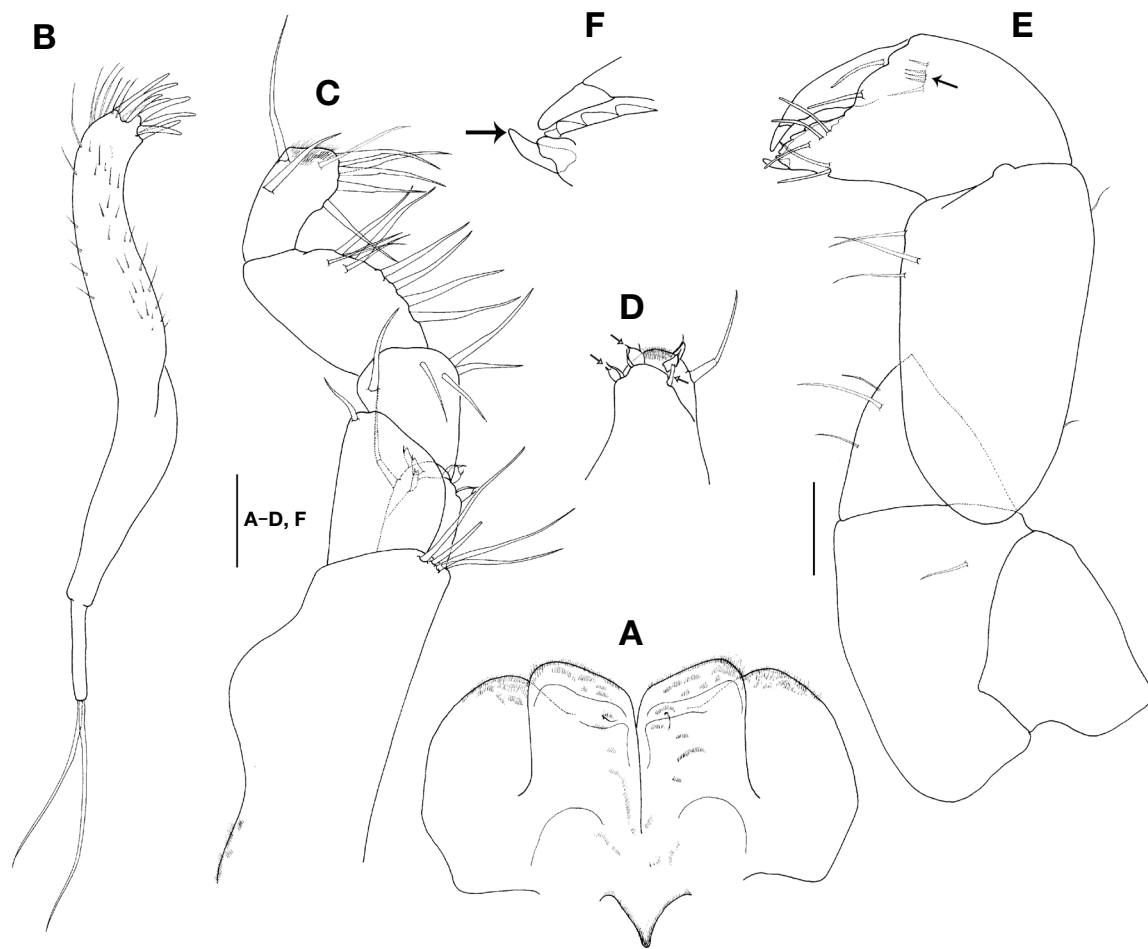


Fig. 3. *Leptochelia grandidentata* n. sp. female (holotype). A, Labium; B, Maxillule; C, Maxilliped; D, Maxilliped endite; E, Cheliped; F, Cheliped dactylus. Scale bars=0.05 mm (A-D, F), 0.1 mm (E).

with 2 ventrodistal spiniform setae and 1 simple seta and 1 spiniform seta on dorsodistal margin. Propodus 1.4 times as long as carpus, dorsal margin with small spine, with 2 ventro-subdistal spiniform setae, 2 dorsodistal simple setae, and 1 small spiniform comb-seta (indicated by arrow). Dactylus and unguis partially fused into claw, curved, and 0.8 times as long as propodus.

Pereopod 5 (Fig. 4E) as pereopod 4, but propodus as long as carpus, with 3 small spiniform comb-setae on distal margin.

Pereopod 6 (Fig. 4F) as pereopod 5, but propodus with 6 comb-setae and 2 simple setae along distal margin.

Pleopod (Fig. 4G) all alike. Basal article with 1 ventral plumose seta (indicated by arrow). Exopod with 19 plumose setae. Endopod with 10 plumose setae along ventral margin, of which distomost seta forming curved and unipinnate tip, and 1 plumose seta on dorsoproximal margin.

Uropod (Fig. 4H) bi-ramous. Basal article naked, 1.5 times as long as wide. Exopod 1-articled, 3.7 times as long as wide, with 1 simple seta on mid-region and 2 terminal simple setae. Endopod 4-articled. Article 1 with 2 simple setae and 1 broom seta. Article 2 with 2 distal simple setae. Article 3 with 1 simple seta and 3 broom setae on distal margin. Article 4 with 5 simple setae and 1 broom seta on distal margin.

Male: not found.

Etymology. The specific name is derived from the Latin adjective “grande” and “dentata”, meaning to a large tooth on the incisive margin of a cheliped fixed finger.

Remarks. *Leptochelia grandidentata* was similar to *L. itoi* and *L. lusei* in some morphological characteristics: cephalothorax 1.4 times as long as wide, pereonites 4 and 5 of sub-equal length, uropod endopod with 4 articles and the first article of equal length to the second article, and uropod ex-

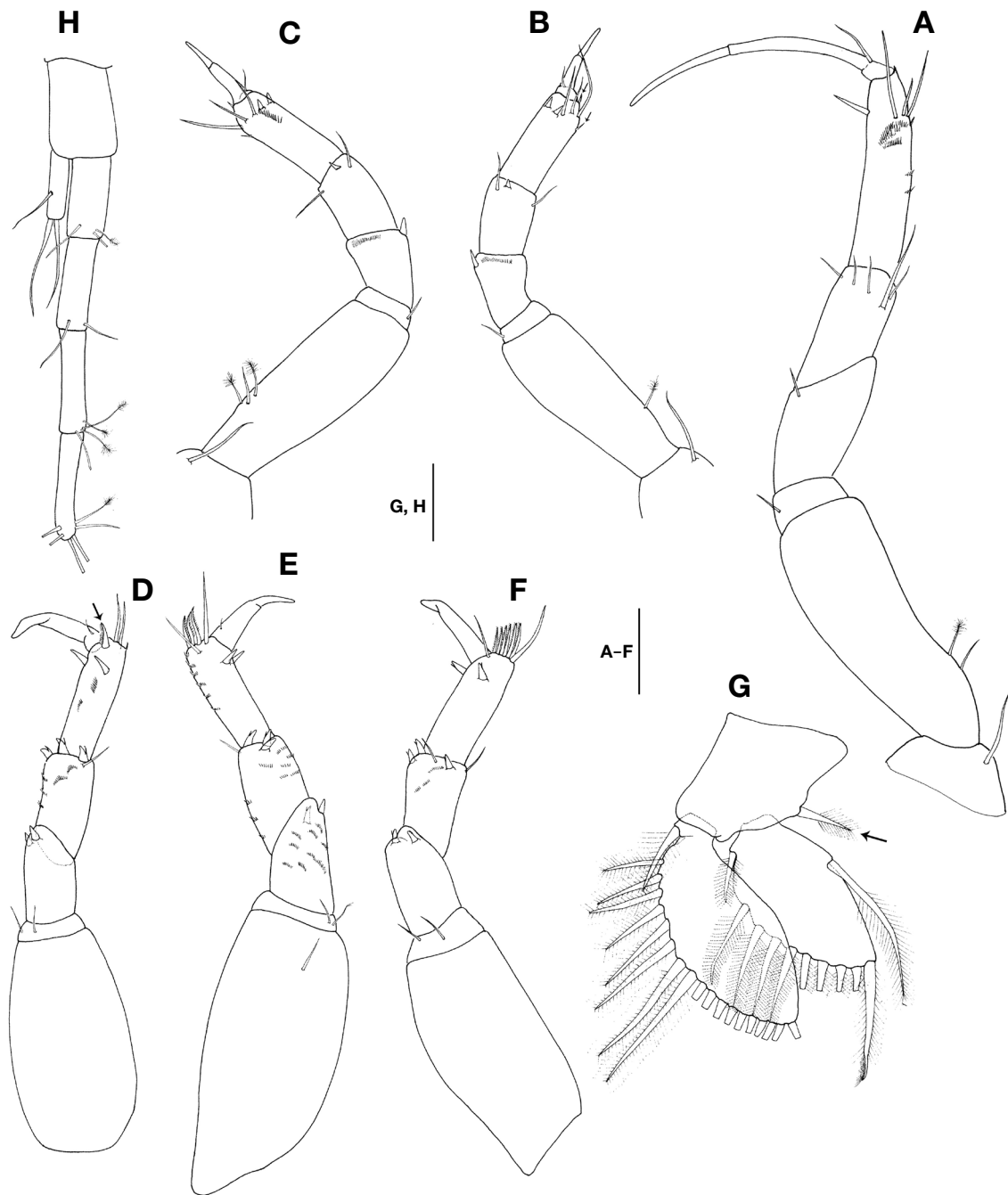


Fig. 4. *Leptochelia grandidentata* n. sp. female (holotype). A, Pereopod 1; B, Pereopod 2; C, Pereopod 3; D, Pereopod 4; E, Pereopod 5; F, Pereopod 6; G, Pleopod; H, Uropod. Scale bars=0.1 mm (A–F), 0.05 mm (G, H).

opod shorter than the first article of endopod. However, *L. grandidentata* differs from *L. itoi* and *L. lusei* by the following morphological combination: the cephalothorax is longer than the pereonites 1–2 (vs. shorter in *L. itoi*); the cheliped fixed finger is with strong teeth along the incisive margin, while without distinct teeth in *L. itoi* and *L. lusei*; the dac-

tylus is shorter than the fixed finger (vs. almost equal or slightly longer); the maxilliped endite bears 4 distal setae (vs. three in both); the right mandible incisive has 8 processes along the dorsal margin (vs. without process in both); in pereopod 1, the dactylus and unguis combined is much longer than the propodus (1.4 times longer vs. subequal in

both); and the pleopod basal article has 1 ventral plumose seta (without in *L. lusei*). In addition, the relatively longer fixed finger of the cheliped compared to the dactylus can show in *L. corsica* Dollfus, 1898; however, it differs from *L. grandidentata* by large size of body (6.28–8 mm), the uropod endopod with 6 articles, the maxilliped basis with 3 distal setae, and the antennule articles 2 and 3 of subequal length.

***Leptochelia suhi* n. sp. (Figs. 5, 6)**

Material examined. Holotype: adult female collected from Taean in the west sea of Korea (36°41'39"N, 126°41'87"E, 1.5 m depth; collector: Man-Ki Jeong) on 30 Mar 2015, dissected and mounted on two slide glasses (MABIKCR 00235207). Paratype: 1 adult female, 1 juvenile in 1 vial (MABIKCR00235208), same data as holotype.

Description. Female: Non-ovigerous. Body (Fig. 5A) length 2.48 mm, 7.7 times as long as wide. Cephalothorax sub-rectangular, proximal margin with conspicuous rounded rostrum, eye lobes rounded, eyes present, 1.5 times as long as wide, slightly longer than pereonites 1 and 2, proximo- and mid-lateral margins with 3 pairs of simple setae.

Pereon (Fig. 5A) pereonite 1 shortest, 0.4 times as long as cephalothorax, with 2 simple setae on proximolateral margin. Pereonites 1 to 5 each with 1 simple seta on mid-lateral margin. Pereonites 4 and 5 equal and longest. Pereonite 6 subequal to pereonite 2. Pereonites 1–6 proportional lengths 12.8 : 14.95 : 17.1 : 20.1 : 20.1 : 14.95.

Pleon (Fig. 5A) with 5 free subequal pleonites bearing pleopods, each pleonite with 1 simple seta. Pleonite 1 longest, 0.3 times as long as wide. Pleonites 2 to 5 subequal in length. Pleonites 1–5 1.1 times as long as wide, 1.5 times as long as pereonite 5.

Pleotelson (Fig. 5A) semicircular, 0.3 times as long as pleonites 1–5, 0.4 times as long as wide bearing simple seta each on lateral and distal margins. Pleonites and pleotelson proportional lengths 19.1 : 15.1 : 13.7 : 13.7 : 15.1 : 23.3.

Antennule (Fig. 5B) with 4 articles. Proportional lengths 58.9 : 16.3 : 22.7 : 2.1. Article 1 elongate, 3 times as long as wide, with 3 broom setae and 1 simple seta on mid- and outer distal outer regions and 1 long simple seta on mid inner region. Article 2 distally tapered, distal margin with 1 simple seta and 2 broom setae. Article 3 1.4 times as long as article 2, with 1 broom seta and 2 simple setae on distal margin. Article 4 minute, with 1 broom seta, 3 slender simple setae, and 1 aesthetasc.

Antenna (Fig. 5C) shorter and slender than antennule, with 6 articles of proportional lengths 14.7 : 15.5 : 17.7 : 31.7 : 18.9 : 1.5. Article 1 slightly longer than wide. Article 2 with single inner distal and outer distal simple spines. Article 3

with 1 outer distal simple spine. Article 4 longest, 1.7 times as long as article 3, 3.1 times as long as wide, with 1 broom seta on mid-inner margin, 3 broom setae and 3 simple setae on distal margin. Article 5 2.6 times as long as wide, with 1 broom seta and 1 simple seta on distal margin. Article 6 short, with 4 simple setae on distal margin.

Mouthparts. Labrum (Fig. 5D) rounded, ornamented with fine setules, typical of genus. Left mandible (Fig. 5E) incisor distally tapered, with 1 process on dorsoproximal margin (indicated by arrow). Lacinia mobilis longer than incisor, distally pointed and with 4 processes along dorsal margin. Molar process robust, outer surface crumpled, with 6 irregular bifid teeth. Right mandible (Fig. 5F) incisor apex weakly bifurcated, with 6 processes along dorsal margin (indicated by arrow). Molar process similar to that of left mandible, but with 11 distal teeth. Labium (Fig. 5G) similar to that of *L. grandidentata*. Maxillule (Fig. 5H) similar to that of *L. grandidentata*, but endite with 11 distal spiniform setae and setose margin. Maxilliped (Fig. 5I, J) bases without fusion, each with 3 simple setae longer than endites. Endite (Fig. 5J) fused to basis, distal margin with 3 short spiniform setae and 1 simple seta (indicated by arrow). Palp article 1 naked. Palp article 2 with 1 dorsal seta and 3 ventral setae. Palp article 3 with filtering rows of 3 long setae and 2 short slender setae, respectively. Palp article 4 with 2 simple setae on dorsal margin and 3 setae on ventral margin.

Cheliped (Fig. 6A, B) basis divided unequally by sclerite attached dorsally, 1.65 times as long as wide. Merus subtriangular, with 3 simple setae of unequal lengths on ventral margin. Carpus 1.2 times as long as basis, 1.8 times as long as wide, ventral margin with 3 simple setae subdistally, dorsal margin with 2 proximal seta and 1 distal seta. Propodus almost 1.2 times longer than basis, as long as carpus, 3 times as long as wide, inner margin with 3 simple setae and ornamented with 2 rows of fine setules (indicated by arrows). Fixed finger similar to that of *L. grandidentata*, but incisive margin with 3 strong blunt teeth. Dactylus as long as fixed finger, with 1 seta on inner proximal margin.

Pereopod 1 (Fig. 6C) basis 3.4 times as long as wide. Ischium compact, with 1 seta. Merus 1 short seta on distoventral margin. Carpus 5 simple setae, longest of which extended to two fifth of propodus. Propodus 1.6 times as long as carpus, with 3 simple setae on dorsal margin and 1 spiniform seta on ventral margin. Dactylus slender, with simple seta on dorsoproximal margin. Unguis subequal to dactylus in length. Combined length of dactylus and unguis 1.2 times longer than propodus.

Pereopod 2 (Fig. 6D) similar to that of *L. grandidentata*. However, basis 2.8 times as long as wide. Merus naked, with 1 spiniform seta. Carpus subequal to merus, with 2 slender simple setae, short spiniform seta, and row of setules along

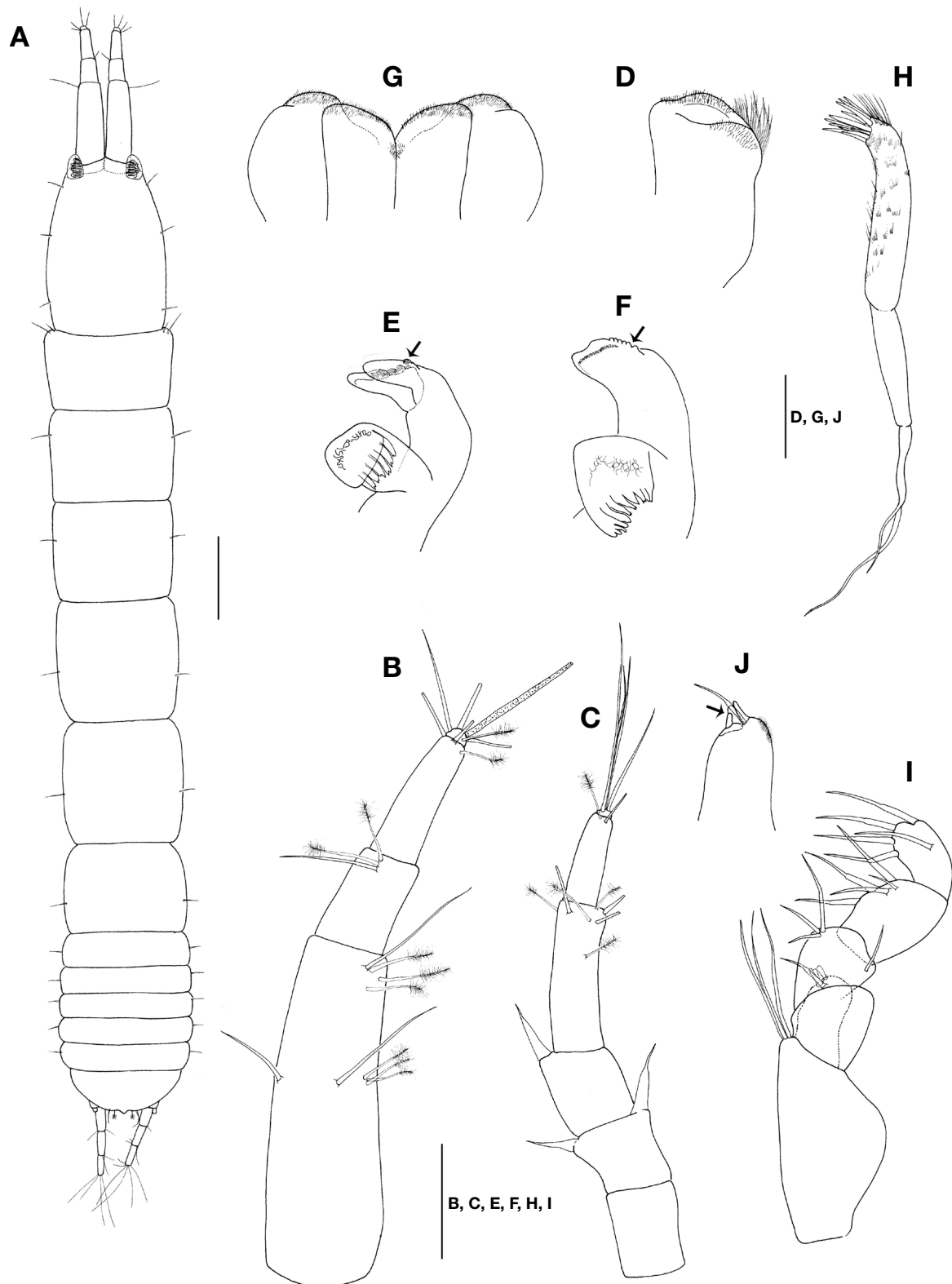


Fig. 5. *Leptochelia suhi* n. sp. female (holotype). A, Habitus, dorsal view; B, Antennule; C, Antenna; D, Labrum; E, Left mandible; F, Right mandible; G, Labium; H, Maxillule; I, Maxilliped; J, Maxilliped endite. Scale bars=0.2 mm (A), 0.1 mm (B, C, E, F, H, I), 0.05 mm (D, G, J).

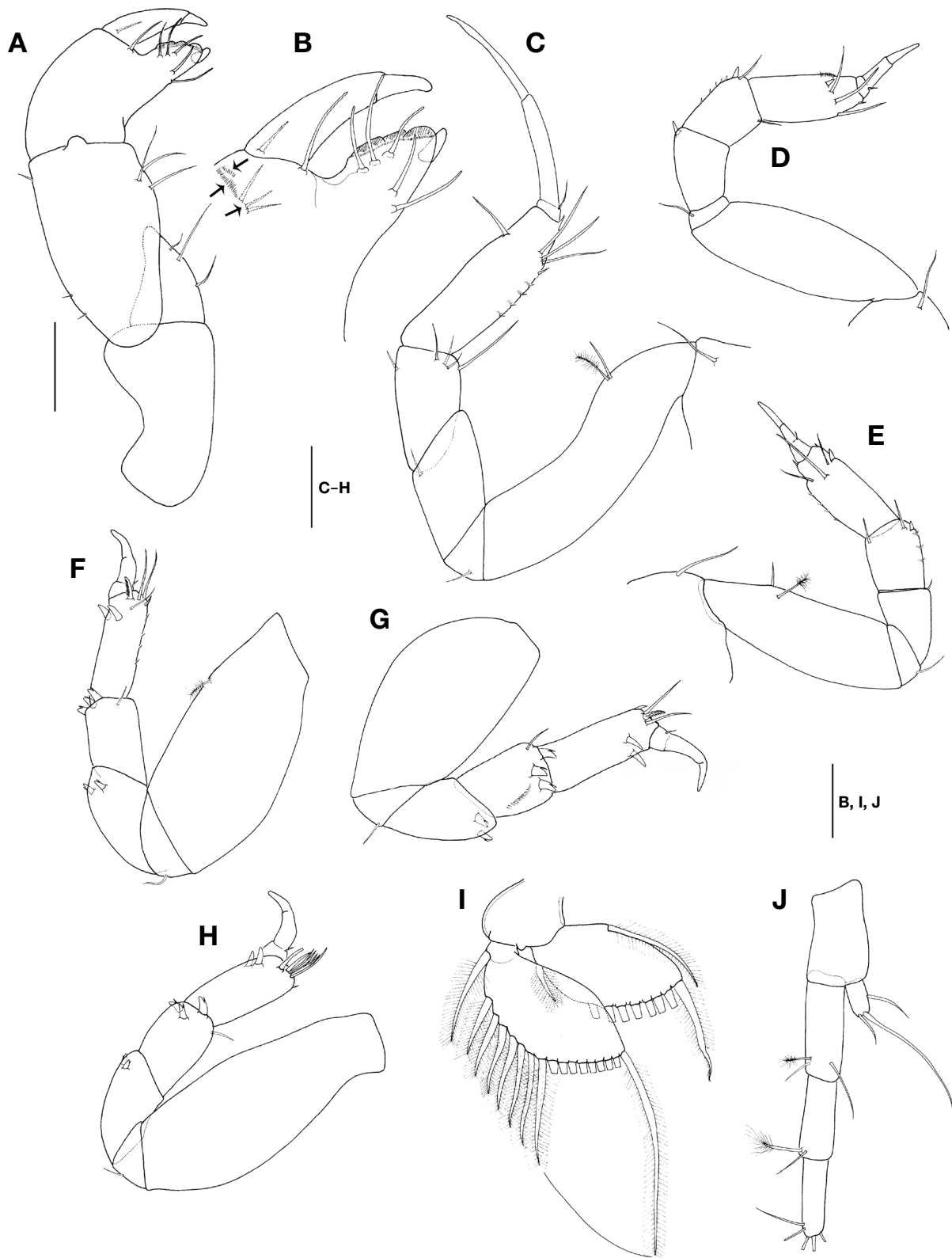


Fig. 6. *Leptochelia suhi* n. sp. female (holotype). A, Cheliped; B, Cheliped chela; C, Pereopod 1; D, Pereopod 2; E, Pereopod 3; F, Pereopod 4; G, Pereopod 5; H, Pereopod 6; I, Pleopod; J, Uropod. Scale bars=0.1 mm (A), 0.05 mm (B, I, J), 0.1 mm (C-H).

ventral margin. Propodus ornamented with minute setules on ventral subdistal margin. Dactylus and unguis combined 0.7 times as long as propodus. Dactylus longer than unguis, with short dorsoproximal seta.

Pereopod 3 (Fig. 6E) basis 2.4 times as long as wide, with 1 broom seta and 1 simple seta on ventroproximal margin. Merus with 1 ventrodistal spiniform seta, more slender than that of pereopod 2. Carpus as long as merus, with 1 short spiniform seta and 2 simple setae on distal margin. Propodus 1.3 times as long as carpus, with 2 short spiniform setae, vertical row of setules, 3 slender simple setae of unequal length, and 2 small spines on distal margin. Dactylus and unguis combined 0.7 times as long as propodus.

Pereopod 4 (Fig. 6F) basis, carpus, and merus similar to those of *L. grandidentata*. Ischium with 1 slender simple setae. Propodus dorsal margin with small spine, with 2 ventro-subdistal spiniform setae, 3 distal simple setae, and 1 small spiniform comb-seta. Dactylus and unguis similar to those of *L. grandidentata*.

Pereopod 5 (Fig. 6G) as pereopod 4, but propodus with 1 small spiniform comb-setae on distal margin.

Pereopod 6 (Fig. 6H) as pereopod 5, but propodus with 6 setae and 2 simple setae along distal margin.

Pleopod (Fig. 6I) all alike. Basal article naked. Exopod with 17 plumose setae. Endopod with 9 plumose setae along ventral margin, of which distomost seta forming curved and unipinnate tip, and 1 plumose seta on dorsoproximal margin.

Uropod (Fig. 6J) bi-ramous. Basal article naked, 1.5 times as long as wide. Exopod one-articled, 1.75 times as long as wide, with 1 simple seta on mid-region and 2 terminal simple setae. Endopod 3-articled. Article 1 with 2 simple setae and 1 broom seta. Article 2 with 1 broom seta and 1 simple seta. Article 3 with 5 simple setae and 3 broom setae.

Male: Not found.

Etymology. This species named in honor of professor Hae-Lip Suh of Chonnam National University, Korea.

Remarks. *Leptochelia suhi* agreed with *L. myora* recorded from the southern Pacific in uropod endopod article 1 longer than article 2, maxilliped endite with 3 distal spiniform setae, and cheliped dactylus subequal to the fixed finger in length. However, *L. suhi* can be differentiated from *L. myora* by the following morphological combination: the cephalothorax is 1.3 times longer than the pleon (vs. shorter); the antennule article 3 is much longer than the article 2 (vs. slightly shorter); the uropod endopod has 3 articles; pereonites 4 and 5 are longest and equal in length; the cheliped fixed finger has 3 robust teeth along the incisive margin (vs. without teeth) and 2 ventral setae (vs. 3); the maxilliped endite bears 3 distal setae (vs. 4); the incisor of the right mandible has 6 processes along the dorsodistal margin, while *L. myora* has processes

along whole dorsal margin; and in right and left mandibles, the molar processes have irregular teeth on the tip (vs. just a blunt tip).

DISCUSSION

Leptochelia is divided into the ‘*minuta*-group’ and the ‘*dubia/savignyi*-group’, the former of which is characterized by a male cheliped being exceedingly longer than the body, and the other by a moderately long and robust male cheliped. The *dubia/savignyi*-group has excessive synonymization to the point of suggesting one cosmopolitan species called either *L. dubia* or *L. savignyi* (Bamber, 2010). Krøyer (1842) described *Tanais dubius*, *T. edwardsii*, and *T. savignyi*, as different species. Shortly afterwards, Dana (1849) erected a new genus, *Leptochelia* for his new species, *L. minuta*, characterized by the long and slender chelipeds of the male. The results indicated *T. edwardsii* as male of *L. savignyi*. Subsequently, additional several closely related species have been placed under a synonym of only one species, *L. dubia*, by Smith (1906). On the other hand, Lang (1973) assigned 10 species of this group (as “*Leptochelia*-Gruppe 2”) as *L. savignyi*. Sieg (1983) synonymized all species of the “*dubia/savignyi* group” as *Leptochelia dubia*, regarding it as a cosmopolitan species. However, Ishimaru (1985) suggested that some of the synonyms of *L. savignyi* might be valid species, differ from *L. savignyi*, presenting a comparison through the detailed descriptions of *L. itoi* and *L. savignyi* from the Japanese waters. Over the last two decades, it is apparent that cosmopolitanism is not found in the genus, due to the minimal dispersive capability presented typically in tanaidomorph tanaidaceans (Larsen, 2001; Bamber, 2010). Therefore, a large number of species of *Leptochelia* are expected to exist, with the co-occurrence of cryptic species (Larsen and Rayment, 2002). Recently, Bamber (2010) redescribed the specimens of *L. savignyi* from Madeira and, the type locality of *L. savignyi* compared to populations of *Leptochelia* previously lumped as *L. dubia* or *L. savignyi*. It was clear that in the *dubia/savignyi* group, 18 species were synonymized as *L. savignyi*, and the remaining more than 20 species were independent species that differed from *L. savignyi*.

Although the genus was common worldwide in shallow waters, and many new species were described, the identification was based on male antennules, uropods (number of segments) and chela (number and position of teeth on the fixed finger) (Bamber, 2010). Therefore, additional identification parameters of individual taxa based on females have been required (Bamber, 2008). In the same vein, some researchers tried to provide the distinct identification keys of species within the group. Sieg (1980) demonstrated the im-

portance of the spination/setation of the pereopods in specific distinctions within the *dubia*-group by examining *L. savignyi* s. str. from the Northeast Atlantic. Ishimaru (1985) provided detailed descriptions of both genders of *L. itoi* and *L. savignyi* from the Japanese water, giving a number of characters for species identification of this group. Bird and Bamber (2000) examined the differences between their *L. lusei* and *L. aff. savignyi*. Bamber (2005) described *L. daggi* and *L. nobbi*, presenting a comprehensive morphological comparison of most females.

Leptochelia are defined as having eyes, spiniform setae on antenna articles 2 and 3, and 3 flat setae on maxilliped endite (Lang, 1973). The useful diagnostic characters are the reduced antennule article 1, setation of the pereopod 1 carpus, the length ratio of antennule articles 2 and 3, the spine number of antenna articles 2 and 3, the length ratios of merus to carpus of pereopods 2 and 3, basis setae and endite spines on the maxilliped, the proportions of the cheliped basis and carpus, the uropod exopod, and the lacinia mobilis of the left mandible (Bamber, 2008).

In this study, we compared the comprehensive morphological characters among the four *Leptochelia* species from the North West Pacific, including 2 species of this study and the closely related species within the *dubia/savignyi* group. This study focused on number of ventral setae on the cheliped fixed finger, presence/absence of basal seta of pleopod, and length ratio of cheliped fixed finger to dactylus, not emphasized as main characters in previous literatures, among two species of *Leptochelia* from the North West Pacific (Table 1). The results show that *L. grandidentata* and *L. suhi* are new: *L. grandidentata* is characterized by the cheliped fixed finger being longer than the dactylus and with 4 irregular teeth along the incisive margin, the antennule article 3 being much longer than the article 2, the pereopod 1 with relatively short basis (length/width 2.8 : 1), the pelopod basal article with 1 inner plumose seta, and the relatively large length to width ratio of uropod exopod; and *L. suhi* by the uropod endopod with 3 articles, the antennule article 3 longer than the article 2, the maxilliped basis with 3 distal setae and the endite with 3 spatulate setae, the cheliped fixed finger with 2 ventral setae, the relatively short basis of pereopod 1 (length/width 3.4 : 1), and the pleopod basal article without seta. In addition, the morphological details, such as the shape and teeth number of molar processes of mandible, the lengths of dactylus and unguis of pereopods 1 to 3, the spine number on the maxilliped endite, the setal number of the maxillule endite, and setal number of merus and propodus of the pereopods 3 to 6, generally differed in the 7 species.

In particular, the combination of the cheliped fixed finger with 2 ventral setae, the relatively short basis of pereopod 1, and the antennule article 3 much longer than the article 2

Table 1. A comparison of morphometric characters among the *Leptochelia* species from the North West Pacific and closely related species to *L. grandidentata* and *L. suhi*

Characters/Species	<i>L. grandidentata</i>	<i>L. suhi</i>	<i>L. savignyi</i>	<i>L. lusei</i>	<i>L. itoi</i>	<i>L. myora</i>	<i>L. savignyi</i> sensu Ishimaru
Total body length (mm)	3.2	2.48	3.4	2.5	2.8	2.0	3.2
Antennule							
Article 1 length to width ratio	2.9 : 1	3 : 1	3.6–3.8 : 1	2.7 : 1	2.5 : 1	2.6 : 1	2.9 : 1
Article 2 length to article 3 length	Longer	Longer	Longer	Longer	Subequal	Shorter	Subequal
Maxilliped							
No. of basis setae	4	3	3/4	3	3	4	4
No. of endite setae	5	3	3	3	5	3	5
Uropod							
No. of endopodal articles	4	3	6	4	4	4	5
Cheliped							
Basis length to width ratio	1.5 : 1	1.6 : 1	2 : 1	1.8 : 1	1.5 : 1	1.3 : 1	1.4 : 1
Carpus length to width ratio	1.9 : 1	1.8 : 1	1.8–1.9 : 1	2.1 : 1	2 : 1	2 : 1	1.8 : 1
Length ratio of dactylus to fixed finger	Shorter	Equal	Equal	Equal	Equal	Equal	Equal
No. of ventral setae on fixed finger	2	2	3	2	4	3	3
No. of teeth on fixed finger	4	3	3	Absent	3	Absent	3
Pereopod 1							
Basis length to width ratio	2.8 : 1	3.4 : 1	4–4.6 : 1	4 : 1	4.2 : 1	2.6 : 1	4.7 : 1
Length ratio of claw (dactylus plus unguis) to propodus	1.4 : 1	1.2 : 1	Equal	1.1 : 1	1.3 : 1	1.3 : 1	1.6 : 1
Pleopod							
Basal article with/without seta	Present	Absent	Present	Absent	Present	Absent	Present

was present only in *L. grandidentata* and *L. suhi*.

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